Designation: A 925 – 03

Standard Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Overhead Ground Wire Strand[1]

This standard is issued under the fixed designation A 925; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers high-strength, extra-high-strength, and utilities grades of concentric lay steel wire strand composed of three wires or seven wires with Class A, Class B, or Class C zinc-5 % aluminum-mischmetal (Zn-5 Al-MM) alloy coatings specifically intended for use as overhead ground wires or static wires for electric power transmission lines.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in brackets are for information only.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 90/A 90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

A 902 Terminology Relating to Metallic-Coated Steel Products

B 750 Specification for Zinc-5 % Aluminum-Mischmetal Alloy (UNS Z 38510) in Ingot Form for Hot-Dip Coatings

E 27 Method for Spectrographic Analysis of Zinc and Zinc Alloys by the Solution-Residue Technique

E 47 Test Method for Chemical Analysis of Zinc Die-Casting Alloys

2.2 *Other Standard:*[3]

GF-1 Standard Practice for Determination of Cerium and Lanthanum Compositions in Galfan Alloy (5-Al-0.04 % La-0.04 % Ce-Bal SHG Zn)

3. Terminology

3.1 Definitions—For definitions of terms used in this specification refer to Terminology A 902.

4. Ordering Information

4.1 Orders for strand purchased under this specification shall include the following information:

4.1.1 Quantity of each size,

4.1.2 Size and grade of strand (Table 1),

4.1.3 Class of Zn-5 Al-MM alloy coating (Section 11 and Table 2), and

4.1.4 ASTM designation and year of issue.

5. Materials and Manufacture

5.1 *Base Metal*—The base metal shall be steel made by any commercially accepted steel making process and of such quality and purity that, when drawn to the size of wire specified and coated with Zn-5 Al-MM alloy, the finished strand and the individual wires shall be of uniform quality and have the properties and characteristics as prescribed in this specification.

5.2 *Coating Bath Analysis*—The bath metal used in continuous hot-dip Zn-5 Al-MM alloy coating shall meet the chemical composition limits specified in Specification B 750.

5.2.1 For a two-step coating operation where the first coating is zinc (hot-dip galvanized or electrogalvanized) the final bath may have an aluminum content of up to 7.2 %, to prevent depletion of the aluminum content of the bath.

5.2.2 *Method of Analysis*—The determination of chemical composition shall be made in accordance with suitable chemical (see Test Method E 47), spectrochemical (see Method E 27), or other methods. In case of dispute, the results secured by Test Method E 47 shall be the basis of acceptance.

5.2.3 A standard practice of X-ray fluorescence spectrometry for determination of cerium and lanthanum in a Zn-5 Al-MM alloy has been established by the International Lead Zinc Research Organization (Standard Practice GF-1).

6. Stranding

6.1 The strand shall have a left lay with a uniform pitch of not more than 16 times the nominal diameter of the strand. A left lay is defined as a counter-clockwise twist away from the observer. Stranding shall be sufficiently close to ensure no significant reduction in diameter when stressed to 10 % of the minimum breaking strength.

[1] This specification is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.12 on Wire Specifications.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from International Lead Zinc Research Organization, 292 Madison Ave., New York, NY 10017.

***A Summary of Changes section appears at the end of this standard.**

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TABLE 1 Physical Properties of Zn-5 Al-MM Alloy-Coated Steel Overhead Ground Wire Strand

Nominal Diameter of Strand, in. [mm]	Number of Wires in Strand	Nominal Diameter of Coated Wire in Strand, in. [mm]	Approximate Weight of Strand, lb/1000 ft [kg/km]	Minimum Breaking Strength of Strand, lbf [kN]		
				High-Strength Grade	Extra-High-Strength Grade	Utilities Grade
5/16 [7.94]	3	0.145 [3.68]	171 [255]	. . .	. . .	6500 [28.9]
5/16 [7.94]	7	0.104 [2.64]	205 [305]	8000 [35.6]	11 200 [49.8]	. . .
3/8 [9.52]	7	0.120 [3.05]	273 [407]	10 800 [48.0]	15 400 [68.4]	11 500 [51.2]
7/16 [11.11]	7	0.145 [3.68]	399 [595]	14 500 [64.5]	20 800 [92.5]	. . .
1/2 [12.7]	7	0.165 [4.19]	517 [770]	18 800 [83.6]	26 900 [119.6]	. . .

TABLE 2 Minimum Weights of Coating

Nominal Diameter of Coated Wire, in. [mm]	Minimum Weight of Coating of Uncoated Wire Surface, oz/ft^2[g/m^2]		
	Class A	Class B	Class C
0.104 [2.64]	0.80 [245]	1.60 [490]	2.40 [730]
0.120 [3.05]	0.85 [260]	1.70 [520]	2.55 [780]
0.145 [3.68]	0.90 [275]	1.80 [550]	2.70 [825]
0.165 [4.19]	0.90 [275]	1.80 [550]	2.70 [825]

7. Preforming Strand

7.1 Preformed strand shall be supplied when so specified by the purchaser. Strand is preformed when the component wires are set to the helical form which they assume in the product by any means of process other than by merely laying them about the strand core.

8. Breaking Strength and Weight

8.1 The approximate weight per unit length of strand and the minimum breaking strength of the finished strand shall be as specified in Table 1.

8.2 A test in which the breaking strength is below the minimum specified and which may have been caused by the slipping of the specimen in the jaws of the testing machine, by breaking within the jaws, or within 1 in. [25.4 mm] of the jaws, or by the improper socketing of a specimen shall be disregarded and another sample from the same coil or reel shall be tested.

9. Elongation

9.1 The elongation of the strand in 24 in. [610 mm], determined in accordance with 9.2, shall be not less than 5 % for the high-strength and for the 5/16-in. [7.94-mm], three-wire utilities grades, and 4 % for the extra-highstrength and for the 3/8-in. [9.52-mm], seven-wire utilities grades.

9.2 The elongation shall be measured as the percentage increase in separation between the jaws of the testing machine from the position after application of the initial load, to the position at initial failure in the test specimen. The separation of the jaws of the testing machine shall be approximately 2 ft [0.61 m] when under an initial load equal to 10 % of the required minimum breaking strength of the strand. The elongation values shall be recorded only for specimens that break over 1 in. [25.4 mm] from jaws of the testing machine.

10. Ductility of Steel

10.1 The individual wires of the completed strand shall not fracture when wrapped at a rate not exceeding 15 turns per minute in a close helix of at least two turns around a cylindrical mandrel equal to three times the nominal diameter of the wire under test.

11. Weight of Coating

11.1 The weight of Zn-5 Al-MM alloy coating shall not be less than that specified in Table 2.

11.2 *Weight of Coating Test*—The Zn-5 Al-MM alloy coating shall be tested for weight by a stripping test in accordance with Test Method A 90/A 90M.

12. Adherence of Coating

12.1 The Zn-5 Al-MM alloy coating shall adhere to the wire without delaminating and without being removable by rubbing with the bare fingers after the individual wires have been wrapped at a rate not exceeding 15 turns per minute, in a close helix of at least two turns around a cylindrical mandrel equal to three times the nominal diameter of the wire under test. Loosening or detachment during the adhesion tests of superficial, small particles of Zn-5 Al-MM alloy formed by mechanical polishing of the surface of Zn-5 Al-MM alloy-coated wire shall not be considered cause for rejection.

13. Joints and Splices

13.1 There shall be no joints of any kind made in the finished wire entering into the construction of the strand.

13.2 Electric-welded butt joints made prior to the start of cold drawing of the wire are permitted; however, no electric-welded butt joints of the wire shall be made during the cold drawing application.

13.3 There shall be no strand joints or strand splices in any length of the completed strand.

14. Permissible Variations in Wire Size

14.1 The diameter of the Zn-5 Al-MM alloy-coated wire forming the strand shall conform to the nominal diameter shown in Table 2 within a tolerance of ±0.004 in. [0.102 mm] for wire sizes 0.104 in. [2.642 mm] and 0.120 in. [3.048 mm] and ±0.005 in. [0.127 mm] for wire sizes 0.145 in. [3.683 mm] and 0.165 in. [4.191 mm].

15. Workmanship, Finish, and Appearance

15.1 The Zn-5 Al-MM alloy-coated wire shall be uniform in diameter and shall be free from splints, scales, inequalities, flaws, and other imperfections not consistent with good commercial practice. The coating shall be continuous and reasonably uniform.

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16. Sampling

16.1 The number of samples to be taken shall be determined by lot size as follows:

Lot Size	Number of Samples
1 to 3 reels	1 from each reel
4 to 30 reels	3 min
31 reels or greater	4 min

16.2 Each sample taken shall be subjected to all tests prescribed in Sections 6, 8, and 9.

16.3 In addition to the strand testing in 16.2, the individual wires from the strand samples shall be tested for compliance with Sections 10, 11, 12, and 14. Select all three wires in three-wire strand, and four of the wires in seven-wire strand. Individual wire samples selected for compliance to Section 14 shall be discarded if any distortion of the wire occurred during the stranding operation.

16.4 Instead of testing the wires from the completed strand in accordance with 16.3, the producer may elect to establish compliance with Sections 10, 11, 12, and 14 of this specification by tests made on the wires prior to stranding, unless otherwise stipulated by the purchaser. However, if the producer makes this election, the purchaser shall still reserve the right to test wires from the completed strand for compliance.

17. Inspection

17.1 The manufacturer shall afford the inspector representing the purchaser all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests and inspection shall be made on the finished strand at the place of manufacture prior to shipment and shall be so conducted as not to interfere unnecessarily with the operation of the works.

18. Rejection

18.1 In case there is a reasonable doubt in the first trial as to the failure of the wire or strand to meet any requirement of this specification, two additional tests shall be made on samples of wire or strand from the same coil or reel, and if failure occurs in either of these tests, the strand shall be rejected.

19. Packaging and Package Marking

19.1 The completed strand shall be furnished on reels sufficiently sturdy to withstand normal service incident to shipping, hauling, and field erection.

19.2 The completed strand shall be furnished in random lengths. At least 95 % of the lengths shall be within the minimum and maximum limits shown in Table 3. Not more than 5 % of a total length ordered may be furnished in lengths that are below the minimum limits shown in Table 3 but which are not less than 1500 ft [457 m] long. Each reel shall be clearly marked to show the length of the strand contained thereon.

19.3 Each reel shall have a strong tag securely fastened to it showing the name of the material "ground wire strand," the length, size, grade of the strand, class of coating, ASTM specification number (A 925), and the name or mark of the manufacturer.

20. Keywords

20.1 coated overhead strand; zinc 5 % aluminum-mischmetal alloy-coated overhead strand

TABLE 3 Range of Strand Lengths per Reel for at Least 95 % of the Completed Strand

Nominal Diameter of Strand, in. [mm]	Number of Wires in Strand	Length of Strand Per Reel for at Least 95 % of the Order, ft [m]	
		Min	Max
5/16 [7.94]	3	4700 [1430]	7900 [2410]
5/16 [7.94]	7	4800 [1460]	7700 [2350][A]
3/8 [9.52]	7	3600 [1100]	5800 [1770][A]
7/16 [11.11]	7	4700 [1430]	7900 [2410]
1/2 [12.7]	7	3600 [1100]	6100 [1860]

[A] Purchasers may procure maximum lengths up to 12 000 ft [3660 m] for 5/16-in. [7.94-mm] diameter strand and up to 9400 ft [2860 m] for 3/8-in. [9.52-mm] diameter strand.

SUMMARY OF CHANGES

Committee A05 has identified the location of selected changes to this standard since the last issue (A 925 - 98) that may impact the use of this standard.

A 925 - 03:

(*1*) Renumbered sections to meet Form and Style requirements.
(*2*) Deleted "Size of Strand" section
(*3*) Changed "base metal" in 5.1 to "any commercially accepted steel making process."
(*4*) Rewrote Section 8. (Breaking Strength and Weight)
(*5*) Made editorial changes in paragraphs 11.1-11.2, 12.1, and Sections 13 and 18.
(*6*) Changed kg/m to kg/km in Table 1.
(*7*) Added Summary of Changes section.

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